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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 09/401,676 | 09/22/1999 | HENRY ESMOND BUTTERWORTH | UK999-027 | 4983 |

7590 04/03/2003

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| EXAMINER | |
|---|---|
| LAFORGIA, CHRISTIAN A | |
| ART UNIT | PAPER NUMBER |
| 2155 | 9 |

DATE MAILED: 04/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/401,676 | BUTTERWORTH ET AL. | |
| | Examiner | Art Unit | |
| | Christian La Forgia | 2155 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *05 March 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 March 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

## DETAILED ACTION

1. The amendment filed on 5 March 2003 is noted and made of record.

2. Claims 1 through 14 are presented for examination.

### *Drawings*

3. The corrected or substitute drawings were received on 5 March 2003. These drawings are accepted.

4. The Patent and Trademark Office no longer makes drawing changes. See 1017 O.G. 4. It is applicant's responsibility to ensure that the drawings are corrected. Corrections must be made in accordance with the instructions below.

## INFORMATION ON HOW TO EFFECT DRAWING CHANGES

**1. Correction of Informalities -- 37 CFR 1.85**

New corrected drawings must be filed with the changes incorporated therein. Identifying indicia, if provided, should include the title of the invention, inventor's name, and application number, or docket number (if any) if an application number has not been assigned to the application. If this information is provided, it must be placed on the front of each sheet and centered within the top margin. If corrected drawings are required in a Notice of Allowability (PTOL-37), the new drawings **MUST** be filed within the **THREE MONTH** shortened statutory period set for reply in the "Notice of Allowability." Extensions of time may NOT be obtained under the provisions of 37 CFR 1.136 for filing the corrected drawings after the mailing of a Notice of Allowability. The drawings should be filed as a separate paper with a transmittal letter addressed to the Official Draftsperson.

**2. Corrections other than Informalities Noted by Draftsperson on form PTO-948.**

All changes to the drawings, other than informalities noted by the Draftsperson, **MUST** be made in the same manner as above except that, normally, a highlighted (preferably red ink) sketch of the changes to be incorporated into the new drawings **MUST** be approved by the examiner before the application will be allowed. No changes will be permitted to be made, other than correction of informalities, unless the examiner has approved the proposed changes.

**Timing of Corrections**

Applicant is required to submit acceptable corrected drawings within the time period set in the Office action. See 37 CFR 1.185(a). Failure to take corrective action within the set (or extended) period will result in **ABANDONMENT** of the application.

***Specification***

5. The use of the trademark IBM RS/6000 and AIX has been noted in this application. It should be capitalized wherever it appears and be accompanied by the generic terminology.

6. Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

***Response to Arguments***

7. Applicant's arguments filed 5 March 2003 have been fully considered but they are not persuasive.

8. With regards to the applicant's claim that Divine discloses nothing about servicing a generated interrupt to schedule a task for later processing of a work item, without re-enabling the interrupt, the Examiner refers to Figure 6 of Divine, in particular parts 605, the interrupt controller, and 602, the stack. The Examiner asserts that interrupt controller taught by Divine disables the interrupt when it is rescheduled to be run at a later point in time. It is also inherently understood that when rescheduling the task that generated the interrupt, interrupts should be disabled as to not cause any false interrupts, interrupts that have not received attention, and so the system does not become overloaded with handling interrupts. In certain circumstances, one interrupt could spawn several collateral interrupts that would be solved by the handling of the first interrupt, therefore it is inherent that such systems disable interrupts until the current interrupt is handled, as disclosed in column 16, lines 38 to 66 of Divine.

9. As per the applicant's argument that Divine does not teach the performing of a speculative scheduling operation, the Examiner again refers to Figure 6 of Divine, particularly parts 605, the interrupt controller, 606, the instruction register, and 607, the control register. The Examiner asserts that these devices in conjunction perform speculative scheduling operations, as further discussed in column 12, lines 7 to 46. Divine teaches operation speculation as the patent discloses predicting jump, branch and load instructions.

10. See further 35 USC § 102 and 35 USC § 102 rejections that follow.

***Claim Rejections - 35 USC § 102***

11. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

12. Claims 1 through 3, 5 through 7, 10 and 11 are rejected under 35 U.S.C. 102(e) as being anticipated by United States Patent No. 6,081,783 to Divine et al., (hereinafter Divine).

13. As per claim 1, Divine teaches a method for processing work items in a data processing system comprising:

14. generating an interrupt in response to receipt of a work item in the system (Figures 1a, 1b, & 1c; column 9, lines 30-45);

15. servicing the generated interrupt to schedule a task for later processing of the work item, without re-enabling the interrupt (column 16, lines 38-66);

16. subsequently executing the task to process the work item (column 16, lines 38-66); and,

17. speculatively scheduling a further task for processing of any work items that are subsequently received in the system (column 16, lines 38-66).

18. Regarding claim 2, Divine teaches executing the speculatively scheduled task to process any work items received by the system (column 16, line 38 to column 17, line 20);

19. on a determination that there are no work items to be processed, enabling the interrupt (column 16, line 38 to column 17, line 20); and,

20. on a determination that there are work items to process, speculatively scheduling a further task, without re-enabling this interrupt (column 16, line 38 to column 17, line 20).

21. With regards to claim 3, Divine teaches the work items are managed on a queue (column 99, lines 37-53).

22. As per claim 5, Divine teaches a data processing system comprising:

23. processing means for executing tasks to process work items in the data processing system (Figures 1a, 1b, 1c, & 3; column 9, lines 30-45; column 10, lines 5-21);and,

24. interrupt generating means for generating an interrupt in response to receipt of a work item in the system (Figures 1a, 1b, & 1c; column 9, lines 30-45);

25. wherein the processing means is operable to:

service the generated interrupt to schedule a task for later processing of the work item, without re-enabling the interrupt (column 16, lines 38-66);

subsequently execute the task to process the work item (column 16, lines 38-66); and,

speculatively schedule a further task for processing any work items that are subsequently received in the system (column 16, lines 38-66).

26. Regarding claim 6, Divine teaches the processing means being operable on a determination that there are work items to be processed to execute the speculatively scheduled task to process the work items and to schedule a further speculative task (column 16, line 38 to column 17, line 20); and,

27. operable on a determination that there are no work items to be processed to enable the interrupt (column 16, line 38 to column 17, line 20).

28. With regards to claim 7, Divine teaches including memory for storing the received work items a queue (Figure 2; column 99, lines 37-53).

29. As per claim 10, Divine teaches a program product comprising a computer usable medium having computer readable program code means embodied in the medium for processing work items in a data processing system, the program code means comprising:

30. code means for causing the data processing system to service a generated work item interrupt to schedule a task for later processing of the work item, without re-enabling the interrupt (Figures 1a, 1b, & 1c; column 9, lines 30-45; column 16, lines 38-66; Appendices);

31. code means for causing the data processing system to subsequently execute the task to process the work item (column 16, lines 38-66; Appendices); and,

32. code means for causing the data processing system to speculatively schedule a further task for processing of any work items that are subsequently received in the system (column 16, lines 38-66; Appendices).

33. Regarding claim 11, Divine teaches code means for causing the data processing system to execute speculatively scheduled task to process any work items (column 16, line 38 to column 17, line 20; Appendices); and,

34. code means for causing the data processing system to enable the interrupt on a determination that there are no work items for processing (column 16, line 38 to column 17, line 20; Appendices).

35. Claims 12 and 14 are rejected under 35 U.S.C. 102(e) as being anticipated by United States Patent No. 6,189,070 to See et al., (hereinafter See).

36. As per claim 12, See teaches a new method of processing work items in a data processing system, comprising:

37. effectively providing an interrupt-based mechanism for processing work items, when the system utilization is low with respect to work items (Figure 3a [block 200], 4a, & 4b; column 5, lines 12-48); and,

38. effectively providing a polling-based mechanism for processing work items, when system utilization is relatively high with respect to work items (Figures 4a & 4b; column 5, line 57 to column 6, line 45).

39. Regarding claim 14, See teaches wherein the data processing system comprises a storage controller (column 3, lines 55-65; column 4, lines 12-53; column 5, line 66 to column 6, line 18).

***Claim Rejections - 35 USC § 103***

40. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

41. Claims 4 and 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Divine in view of United States Patent No. 5,555,420 to Sarangdhar et al., (hereinafter Sarangdhar).

42. As per claim 4, Divine does not teach an event that further work items are received after the task is scheduled and prior to execution of the task, the step of executing the task comprises processing all the received work items.

43. Sarangdhar teaches an event that further work items are received after the task is scheduled and prior to execution of the task, the step of executing the task comprises processing all the received work items (column 16, line 9 to column 17, line 21). Therefore it would have been obvious to one with ordinary skill in the art at the time the invention was made to include the scheduling and execution steps of Sarangdhar with the system of Divine, because it would allow the microprocessors to continue processing the tasks on the queue without being pre-empted.

44. As per claim 8, Divine does not teach an event that further work items are received after the task is scheduled and prior to execution of the task, the processing means is operable to execute to process all the work items.

45. Sarangdhar teaches an event that further work items are received after the task is scheduled and prior to execution of the task, the processing means is operable to execute to process all the work items (column 16, line 9 to column 17, line 21). Therefore it would have

been obvious to one with ordinary skill in the art at the time the invention was made to include the scheduling and execution steps of Sarangdhar with the system of Divine, because it would allow the microprocessors to continue processing the tasks on the queue without being pre-empted.

46. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Divine in view of United States Patent No. 5,682,554 to Harrell.

47. Divine does not teach the interrupt generating means and processing means are embodied in a data storage controller and the work items comprise data transfer requests from an attached host system.

48. Harrell teaches the interrupt generating means and processing means are embodied in a data storage controller and the work items comprise data transfer requests from an attached host system (Figure 2; column 2, lines 46-52). Therefore, it would have been obvious to one with ordinary skill in the art at the time the invention was made to include the data transfer requests of Harrell to the system of Divine, because it would ensure an efficient and fast data transfer between the host computer and subsequent computers.

49. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over See in view of United States Patent No. 5,590,288 to Castor et al., (hereinafter Castor).

50. With regards to claim 13, See does not teach wherein work item are received in accordance with at least one device driver associated with a host system.

51. Castor teaches wherein work item are received in accordance with at least one device driver associated with a host system (column 3, lines 46-65; column 3, line 67 to column 4, line 10; column 10, lines 14-35). Therefore it would have been obvious to one of ordinary skill in the art to combine the device driver of Castor with the system of See, because it would enable a more versatile system. By combining the systems of Castor and See, it would be proper to form a system that would use interrupt and polling mechanisms to gather data, as well as add or update hardware by using similar interrupt and polling mechanisms, ergo creating an easier and more efficient way to update and manage device drivers.

***Conclusion***

52. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

53. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

54. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christian La Forgia whose telephone number is (703) 305-7704. The examiner can normally be reached on Monday thru Thursday 7-5.

55. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ayaz Sheikh can be reached on (703) 305-9648. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 746-7240 for regular communications and (703) 746-7239 for After Final communications.

56. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Christian La Forgia
Patent Examiner
Art Unit 2155

clf
March 28, 2003

AYAZ SHEIKH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100